

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANT: GANDEL; Pierre

SERIAL NO.: 10/505,246

ART UNIT: 2834

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EXAMINER: Preston, E.D.

TITLE: LINEAR ACTUATOR COMPRISING A BRUSHLESS POLYPHASE ELECTRIC
MOTOR

Amendment C: REMARKS

Upon entry of the present amendments, previous Claims 25 - 35 have been canceled and new Claims 36 - 44 substituted therefor. Claims 1-24 were previously canceled. Reconsideration of the rejections, in light of the forgoing amendments and present remarks, is respectfully requested. The present amendments have been entered for the purpose of more clearly distinguishing the present invention from the prior art.

In the Office Action, it was indicated that Claims 25 - 27, 29, 31, 34 and 35 were rejected under 35 U.S.C. § 102(e) as being anticipated by the Miller patent. Claim 28 was rejected under 35 U.S.C. § 103(a) as being obvious over the Miller patent in view of the Akagi patent. Claim 30 was rejected under 35 U.S.C. § 103(a) as being unpatentable over the Miller patent in view of the Okabe patent. Claim 32 was rejected under 35 U.S.C. § 103(a) as being unpatentable over the Miller patent in view of the Lamb patent. Claims 34 and 35 were rejected under 35 U.S.C. § 103(a) as being unpatentable over the Miller patent in view of the Huber patent. Importantly, it was indicated that Claim 33 was "objected to" as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

As an overview to the present reply, Applicant has revised previous Claim 25 in the form of new independent Claim 36. New independent Claim 36 incorporates the limitations of previous independent Claim 25, along with the limitations of dependent Claims 29 and 30. In particular, New independent Claim 36 indicates that the driving means is a "screw and nut system" in which the screw is a threaded rod engaged coaxially with the nut. It is further indicated that the nut is carried by the rotor. The nut is movable in a helical direction under the stator such that the nut "transmits" linear displacement to the control organ. Applicant respectfully contends these features serve to distinguish the present invention from the prior art Miller patent.

The Miller patent specifically relates to an actuator which transforms rotation movement into a linear movement. In particular, this means of transforming rotational movement into linear movement utilizes a ball-ramp associated with a screw. As was stated in column 6, lines 3 - 14 in the Miller patent:

The valve stem 126 has a helical groove 130 that is separated by a land portion 132. The helical groove 130 has the same pitch as the helical groove 116 of the ball nut 102. Accordingly, the helical groove 116, 130 form a raceway between the rotor 68 and the valve 70. Upon rotation of the rotor 68, the ball bearings 122 travel in the helical groove 116, 130 and are recirculated in the raceway by the return channel 120.

Unfortunately, the system of ball-screws is particularly expensive from the point of view of fabrication as well as assembly.

In contrast, the brushless motor of the present invention has only a weak residual couple which, precisely, allows the actuator to return to the initial position even with a nut-type construction. As such, the present invention avoids the need for the ball-screw assembly which is very expensive. Although the ball-screw assembly allows high intrinsic reversibility, it is

unavoidably expensive to fabricate and expensive to assemble.

It is important to note that, as was provided in the description, the uncoupling of the speed-reduction and motor-conversion functions allows the use of a large pitch at the level of the helical system so as to ensure these functions. The reduction device is then independently parameterized. As such, the output is substantially constant with respect to the reduction. This separation of the functions provides, for the same reduction, a higher total output when compared to the sole use of a helical system. So as to particularly focus on this particular feature, new independent Claim 36 incorporates the language found in previous dependent Claim 30 in which the "nut" is movable in a "helical direction".

Applicant also notes that independent Claim 36 includes the limitation of "said driving means having an independent reversible reduction means cooperative therewith". Applicant respectfully contends that this reduction means is not shown, nor described, in the prior art Miller patent. As such, independent Claim 36 should be patentably distinguishable from the prior art Miller patent.

Fundamentally, the present invention, as defined by independent Claim 36, distinguishes the structure of the present invention from the prior art Miller patent. As was stated in the original specification, the present invention uncouples the speed-reduction and motor-conversion function so as to allow for the use of a large pitch in the helical system. This function was neither shown nor suggested by the prior art Miller patent. Finally, the present invention achieves the unexpected results in the form of reduction in costs for fabrication and assembly. On this basis, Applicant contends that independent Claim 36 is neither anticipated by, nor obvious in view of, the prior art Miller patent.

Dependent Claims 37 - 39 herein correspond, respectively, to the limitations found in

previous dependent Claims 26 - 28. New dependent Claims 40 - 44 correspond, respectively, to the limitations found in previous dependent Claims 31 - 35.

Based upon the foregoing analysis, Applicant contends that independent Claim 36 is now in proper condition for allowance. Additionally, those claims which are dependent upon this independent claim should also be in condition for allowance. Reconsideration of the rejections and allowance of the claims at an early date is earnestly solicited. Since no new claims have been added above those originally paid for, no additional fee is required.

Respectfully submitted,

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Date

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